THE STRONGLY COUNTER-IRRITANT EFFECTS OF THE USUAL MASTOID OPERATION.

By ALBERT H. BUCK, M. D.,

NEW YORK, N. Y.

CLINICAL PROFESSOR OF THE DISEASES OF THE EAR, COLLEGE OF PHYSICIANS AND SURGEONS, MEDICAL DEPARTMENT OF COLUMBIA COLLEGE; CONSULTING AURAL SURGEON, NEW YORK EYE AND EAR INFIRMARY, AND THE PRESBYTERIAN HOSPITAL.

REPRINTED FROM THE TRANSACTIONS OF THE AMERICAN OTOLOGICAL SOCIETY, 1898.

With author's compliments.

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The main object kept before the mind of the surgeon in opening into the mastoid process is the establishment of a free channel between the outer world and the centre of disease, which latter, in most instances, is situated either in some part of the middle ear or in the mastoid bone itself. Through this channel the products of inflammation find a much easier way of escape than by any route that nature may establish through ulcerative action, and through it, besides, the surgeon is able to introduce such remedial or mere cleansing fluids as he may think likely to exert a curative effect. But in certain cases, and they are by no means rare, the good effects of the operation are not confined to the benefits directly attributable to good drainage and thorough cleansing of the parts; the derivative or counter-irritant influence of the operation plays, I believe, a very important part in effecting a cure of these cases, and it is for the purpose of directing attention to this point that I have prepared the present paper.

Setons and issues were looked upon as valuable therapeutic agents even so recently as twenty-five years ago, but nowadays one scarcely ever hears them mentioned. In operating upon the mastoid we may establish an issue on a comparatively large scale. A gaping wound, two or three inches in length, is made in the skin, and a pit large enough to admit the end of the forefinger is exca-

vated in the underlying bone itself. This deep excavation may be left gaping, and afterwards, for a time at least, be treated as an open wound. When this course is adopted, we have all the essential conditions of a large issue; and if there be any virtue in the principle of counter-irritation, the beneficial effects that flow from it will be provided in liberal measure to the patient thus operated upon. On the other hand, if the edges of this gaping wound are stitched together in accurate coaptation, only a small outlet for the discharge being left at the lower angle; and then, if, in addition, such dressings are applied that no micro-organisms can by any possibility find an entrance into the wound, our patient will certainly be deprived in large measure, if not wholly, of whatever good effects counter-irritation is competent to supply. In the majority of cases, as I have already intimated, the disease will be cured without the aid of such additional counter-irritation, but in those cases in which the disease of the ear has set up more or less active intra-cranial inflammation, this counter-irritant power may be sufficient to turn the scale from a fatal to a favorable issue.

While I cannot hope to furnish from my case book convincing proofs of the correctness of this doctrine, I believe that the histories of the following three cases will go far towards establishing its soundness.

Case I.—The patient, a vigorous man, about 38 years of age, consulted me in March, 1890, for the relief of a discharge from the left ear, of at least thirty years' standing. Aside from the discharge and some impairment of the hearing, the ear, he said, had given him no trouble until within a few days, when a certain amount of bleeding became associated with the discharge, and had continued since. On examination I found the left external auditory canal filled with a large and very vascular poly-

poid growth. I removed it with the snare and found that it sprang from what was left of the drum-membrane, in the neighborhood of the hammer. I recommended the daily use of Angelo's ear douche, and under this *régime* the ear gave him no further trouble during the subsequent three years.

On April 15th or 16th of the present year, he sat at an open window, with a current of air blowing upon the left side of the head. Soon afterward the ear became painful, and the pain continued to increase steadily until the 18th, when he called upon me to obtain relief. On examination I found that the upper cutaneous wall of the left external auditory canal was markedly collapsed. There was a scanty, rather thin, pinkish, foul-smelling discharge in the canal. The body temperature was 103° F., and the pulse, 102. The pain was referred to the deeper parts of the ear, and to the whole left side of the head. There was no tenderness over the mastoid region.

The treatment adopted, and carried out by my associate, Dr. Robert Lewis, was the following: A free, curving incision was made across the cutaneous wall of the canal at the point of greatest prolapse, and through this opening a slightly curved silver cannula was introduced. Through this a stream of a 1 to 4,000 bichloride of mercury solution was forced by air pressure generated through the instrumentality of a rubber foot bag. This irrigation brought away an appreciable quantity of foul, cheesy material; the stream apparently escaping directly from the middle ear. Three leeches were also applied behind and below the ear, as close as possible to the auricle; and the patient was instructed to have hot flax-seed poultices applied continuously for three hours. Internally, he was given one grain of calomel, to be followed, the next morning early, by a full dose of Rubinat Condal water.

On April 19th, the patient was found to have less pain,

and the temperature had fallen to 102° F. The probe, passed through the opening in the collapsed portion of the wall of the canal, encountered everywhere roughened bone. Dr. Lewis therefore attempted, by passing a small-sized Volkmann's spoon (bowl=3 mm. in diameter) through the artificial opening, to gnaw away so much of the intervening ridge of bone—presumably carious—that the stream of water from his cannula would play directly upon the contents of the antrum. In this he apparently succeeded, for in the subsequent washing he drove out considerable quantities of foul, cheesy material.

During the next two or three days all the local symptoms improved greatly. The discharge almost entirely lost its foul odor, the prolapsed wall of the canal returned to its natural position, the temperature and pulse became nearly normal, and the pain had very decidedly diminished in severity. The appetite, however, did not return, and the patient showed no desire to leave his bed. His tongue also remained heavily coated. The urine had been examined by his regular medical attendant, Dr. Samuel K. Lyon, and found to be normal.

On April 25th, the temperature again rose to 103° F., and the patient seemed to have passed into a state of semi-stupor. As the ear had improved so markedly, it was thought that there might be a malarial element underlying the rise in temperature and the mental hebetude. Accordingly quinine was administered in divided doses until he had taken, during the twenty-four hours, twenty grains. An ice-cap was also kept constantly applied to his head. These measures produced no perceptible effect upon either the temperature or the drowsiness, and, at the suggestion of his physician, he was given two doses (about four hours apart, the one from the other) of the hydro-bromide of hyoscine, $\frac{1}{120}$ grain in each dose. This was on April 26th.

On April 27th, the patient was found to be greatly improved in every way. The temperature had fallen to normal. The drowsiness had disappeared, the dusky color of his face had changed to a natural ruddy hue. His eyes were bright. He asked for food. In a word, he seemed at last to be on the high road to getting well.

The visible parts of the ear having shown no signs of inflammatory action for at least three or four days, and apparently not requiring any other treatment than the frequent use of the warm douche with a very weak sublimate solution, the patient was left in charge of his regular attendant.

As we afterwards learned, the improvement noted above lasted only about twenty-four hours. The fever and drowsiness then returned, the right side of the body became paralyzed, and the patient died on the third or fourth day after we had last seen him.

This case is brought forward on account of the indirect testimony which it furnishes of the correctness of the statement that in those cases where the ear disease has already set up a certain amount of inflammation at the base of the brain, it is not sufficient to thoroughly drain and cleanse the original seat of the disease in the ear. Something more potent is required to bring about a subsidence of the deep-seated inflammation, and this is to be found, I believe, in the counter-irritation furnished by the usual mastoid operation. In direct confirmation of this belief I will give the details of a second case in which the local conditions of disease in the ear were very much the same as those noted in Case I., while the evidences of intra-cranial disease, at the time of the operation, were more pronounced. In fact, there was already well-marked paralysis on the opposite side of the body, and yet the patient recovered.

Case II.—The patient, a man 22 years of age, and of good general health, consulted me at my office, on January 7th, 1893, on account of long-standing trouble in the left ear. He gave the following history: There had been a discharge from the left ear since childhood, and on several occasions he had experienced pain in the ear, lasting perhaps for two or three days and then passing off. The last of these attacks had occurred during the previous November and had been of unusual severity. From that time to the present he had experienced a great deal of dizziness, and at times he had felt decidedly chilly, without having, however, a distinct chill. At other times he had felt feverish. The discharge, during this period, had remained unchanged in quantity, but from time to time he had found it streaked with blood. His general health had deteriorated appreciably during this period, and he had lost flesh to the extent of twenty pounds. Quite recently there had developed a new symptom which had given his family some alarm. I refer to the sensation observed on the right side of walking on cushions. His gait, too, had become somewhat unsteady, through his inability to perfectly control the motions of the right leg.

When the patient called at my office, I observed that he dragged the right leg a little, and that he presented the facial aspect of one who was seriously ill. An examination of the ear revealed the existence of a large polypoid mass which nearly filled the left external auditory canal. After it had been removed, it was found that an opening into the tympanic cavity existed in the vicinity of Shrapnell's membrane. A slender probe was introduced, but no exposed bone was encountered. Hyperostosis of the inner half of the external auditory canal concealed a large part of the drum-membrane. The odor of the discharge coming through the sinus was very offensive. There was no

tenderness or redness at any point in the immediate neighborhood of the ear. Mastoid operation advised.

On January 10th, three days later, I found the patient at his home in the country, materially worse. There was a moderate elevation of temperature (about 101.5° F.), and his pulse varied from 100 to 110 beats per minute, being at the same time quite weak. He had scarcely any power over the movements of the right leg, and he expressed himself as feeling very ill. Shortly afterwards he had a distinct chill.

Ether was administered and the operation of opening into the mastoid antrum was performed in the usual manner. The bone was found to be everywhere of ivory-like consistence, requiring considerable force of the mallet to drive the chisel through it. Volkmann's spoons proved to be of no use until the antrum had actually been reached. They were then used in enlarging the opening into this cavity. By repeated injections of a warm 1 to 4,000 bichloride of mercury solution, and by the frequent employment of the slender middle ear probe, which was pushed as far as possible in all directions, the cavities of the middle ear were finally cleared of their foul cheesy contents. It was surprising how large a quantity of this material was stowed away in this comparatively small space. A careful exploration was made for the purpose of ascertaining whether, through destructive ulceration, an opening had not been established in the bony tegmen tympani. No such opening, however, could be found.

The edges of the wound were left gaping; iodoform gauze dressings were applied; and daily cleansing of the parts constituted the essential feature of the after-treatment. (The patient was under the care of Dr. T. H. Andress, of Sparta, N. J.) About the fifth or sixth day, when it was found that the case was progressing favorably in every respect, the edges of the granulating wound

were approximated by means of a silver suture, which had been put in place (ready to be utilized at some later date) at the time of the operation. On February 16th, five weeks after the operation, the patient called to see me at my office. The external wound had entirely healed, but there was still a very slight discharge from the external auditory canal. All pain in the ear and head had disappeared, and the right leg had returned to an entirely normal condition. His general health was excellent.

In the following case, thanks to an error which I made in the diagnosis, I am warranted in excluding wholly from consideration the possible effects of drainage and cleansing upon the favorable course pursued by the obscure deeper-lying disease. Absolutely no ear disease whatever was found to exist in this case at the time of the operation, and consequently, in weighing the therapeutic effects of the latter, we are perfectly justified in speaking of it as an issue pure and simple.

The history of the case is as follows:

Case III.—The patient, a lady about 50 years of age, and, up to the time of the attack, in good general health, contracted a bad cold in the head early in April, 1892. This was soon followed by tinnitus and pain in the left ear, and impairment of the hearing. The pain resisted the ordinary measures employed for its relief, and gradually increased in severity. It involved the entire left side of the head, but was referred more particularly to the mastoid region. When the patient was seen by Dr. Thomas E. Satterthwaite, about May 1st, he found decided swelling and tenderness of the auricle and neighboring soft parts; the motions of the jaw caused pain in the left ear; the glands on the side of the neck, below the ear, were swollen; and there was a tense swelling on the

posterior wall of the pharynx, behind the left tonsil. An incision of this swelling afforded escape to a considerable quantity of creamy pus. The posterior wall of the left external auditory canal was found to be swollen, and an incision in this region also gave vent to a certain amount of pus. From this time onward, for a period of nearly three weeks, the patient experienced comparatively little pain in the ear or in any part of the head. The hearing, on the left side, soon returned to a fairly normal condition. Pus, however, continued to escape from the opening in the posterior pharyngeal wall, and the patient steadily grew weaker. The constant escape of pus into the fauces rendered her less and less desirous to take food. In fact, she had to be coaxed a great deal before she could be induced to take the necessary amount of nourishment. It was observed, too, that her mind was beginning to be perceptibly affected, and the pupil of the left eye was noticeably larger than that of the right. The body temperature did not at any time during her illness rise above 99.5° F. The pulse rate was about 80, and the pulsations, as might be expected, were feeble. About May 20th, she was seen by Dr. Robert Abbe, of this city. He was disposed to refer the source of the pus, which continued to flow abundantly from the opening in the pharyngeal wall, to disease of the sphenoid bone. He advised against operative interference. Shortly after this, the patient again began to complain of pain in the left mastoid region, and it was found that the hearing of the left ear had again become somewhat affected. There was also some redness of skin behind the left ear, together with slight tenderness on pressure. As these symptoms persisted, I was asked (May 26th) to see the case in consultation with Dr. Satterthwaite and Dr. Terhune, of Passaic, N. J. I found the patient in a condi-

tion of semi-stupor, whether from simple physical weakness or not, I could not determine. Her pulse was 80 and decidedly weak. There seemed to be some redness and swelling of the left mastoid integuments, but as a blister had been applied over the lower part of the process, and some distance below it, two or three days previously, I could not feel sure of the correctness of my observation. The external auditory canal and the membrana tympani were entirely free from any evidence whatsoever of inflammatory action. The spitting-cup, filled with water, was shown to me, and in it, floating as a separate mass, was about a tablespoonful of thick yellow pus. This represented, I was told, the entire quantity that the patient had spat out during the previous twenty-four hours. An examination of the pharynx revealed no points of special interest. The exact spot from which the pus escaped could not be verified by mere ocular inspection.

In the presence of such conflicting evidence—a history pointing strongly to the left ear as the primary seat of all the trouble, and yet, at the time of my examination, an almost entire absence of any recognizable disturbance in the ear—I felt considerable hesitation about putting forward even a diagnosis of probabilities. Nevertheless, from the sequence of pathological events, and especially from the recent return of mastoid pain and tenderness, I felt disposed to believe that there was still, in the substance of the mastoid process, a small remaining centre of osteitis, the purulent products of which were escaping through some opening in the under part of the process, presumably in the vicinity of the digastric fossa, and were seeking an outlet through the unhealed opening made with the knife in the post-pharyngeal abcess. This centre, I assumed, must necessarily be somewhat removed from the mastoid antrum, and from that part of the process which constitutes the posterior wall of the external

auditory canal; for otherwise it would have betrayed its existence by redness or swelling of the soft parts of this canal, both of which conditions (as already stated) were absent. I further argued that if, perchance, this diagnosis should prove to be correct, the more direct drainage and ultimate healing of this centre of mastoid inflammation which we might reasonably expect to obtain by an operation, would in all probability cause the post-pharyngeal abscess to heal.

On the following day, May 27th, the operation was performed. A curving incision, about two and a half inches in length, was made through the skin and periosteum, the outer surface of the mastoid bone was freely exposed, and by means of the chisel and mallet and Volkmann's spoons, a large part of the bone substance lying external to the antrum was removed. Not a trace of anything like diseased bone was found, either in the main body of the bony prominence or in the direction of its tip, a large part of which was removed with the Volkmann's spoons. There was not even any recognizable congestion of these parts. In a word, the mastoid was found to be in a perfectly healthy condition.

The edges of the wound were left gaping, and simple iodoform gauze dressings were applied. From this time forward the patient, who remained under the care of her regular attendant at first, and then for a brief period under that of my associate, Dr. Robert Lewis, improved steadily, although not rapidly. In the course of from four to five weeks the outside wound had healed, the discharge from the post-pharyngeal abscess had ceased, the mental disturbances had disappeared, and she had fully regained her general health and strength.

By way of summing up, let me rehearse briefly the salient distinguishing features of the foregoing three cases.

In the first two, it is highly probable that the intra-cranial lesions were very nearly alike in extent and intensity. In the one, the original centre of carious bone, with its accumulation of foul *débris*, was effectively cleansed and drained, and yet the intra-cranial disease pursued its course to a fatal termination without manifesting any but a transient tendency to quiet down under the influence of this drainage and cleansing. It had acquired so great an independent momentum that it no longer needed, for a continuance of its harmful course, the stimulus of the adjacent centre of middle ear disease. The same remarks, I believe, apply with equal correctness to the second case. Here, too, the original centre of carious bone disease in the middle ear was drained and cleansed, but the intra-cranial disease, instead of growing worse, underwent a steady and permanent change for the better. To what shall we attribute this favorable change if not to the powerful counter-irritant effect furnished by the presence of an extensive issue in the immediate neighborhood?

Finally, in the third case, the conditions of our problem in therapeutics are rendered peculiarly simple by the entire absence, so far as could be ascertained, of any centre of disease in the middle ear or mastoid bone. In this case, therefore, the establishment of an issue pure and simple is the only therapeutic procedure of which there can be any question. Indisputable, too, is the existence of some deep-seated and serious disease; whether at the base of the brain, or in the sphenoid bone, or where, is just now a matter of no special importance. The patient's full, and, on the whole, rather quick recovery completes the series of facts. Do they not warrant the conclusion that counter-irritation, in the form of an extensive issue, effected the cure obtained in this case?